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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Abhijeet Gole

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EXAMINER

VO, THANH DUC

ART UNIT

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2189

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/692,495	Applicant(s) GOLE ET AL.	
	Examiner Thanh D. Vo	Art Unit 2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6-8,10,12,14,15,17 and 19-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17,19 and 20 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6-8,10,12,14,15,21 and 23-27 is/are rejected.
- 7) ☒ Claim(s) 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on April 28, 2008. Claims 1, 3-4, 6-8, 10, 12, 14-15, 17, and 19-27 are presented for examination. Claims 1, 3-4, 6-8, 10, 12, 14-15, 17, and 19-27 are pending. All objections or rejections not repeated below are withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanai et al. (6,502,205) in view of Zondervan et al. (US Patent 6,516,327) .

As per claim 21, Yanai et al. disclose a method of mirroring data, the method comprising, the method comprising:

operating a destination storage server to maintain a plurality of mirror volumes (Fig. 4, disk drive in secondary storage server) in a non-volatile mass storage subsystem (Fig. 1, disk array), wherein each mirror volume mirrors a corresponding one of a plurality of source volumes maintained by a plurality of source storage servers that are coupled to communicate with the destination storage server (col. 2, lines 60-65);
receiving, at the destination storage server, write requests from the plurality of source storage servers, each said write request corresponding to a write request

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received by one of the plurality of source storage servers from a storage client for updating one of the plurality of source volumes (col. 2, lines 60-67);

operating the destination storage server to store the write requests temporarily prior to synchronizing the mirror volumes with the source volumes, including storing a log of the write requests received by the destination storage server from the plurality source storage servers in a non-volatile random access memory (col. 18, lines 5-9) in the destination storage server (col. 32, lines 49-58),

using the destination storage server to maintain a plurality of files in a non-volatile mass storage subsystem, each said file corresponding to a source storage servers, and storing each write request received by the destination storage server from a source storage server in one of said files which corresponds to said source storage server (col. 32, lines 59-67); and

in response to receiving a specified signal from the source storage server, operating the destination storage server to synchronize the plurality of mirror volumes with the plurality of source volumes based on the write requests received from the plurality of source storage servers (col. 32, lines 49-58, wherein a specified signal from the source storage server is inherent in Yanai et al. in order to perform the operation in the cited lines and column).

Although Yanai discloses log file and data file in singular term but such log file and data file illustrate in Fig. 12 is readily apparent to one having an ordinary skill in the art to comprise multiple data files because the storage system of Yanai are storage servers, wherein storage servers are apparently being used to storage a mass amount

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of data which collectively comprising mass amount of data files (See col. 33, lines 10-26, wherein Yanai et al. discloses various files). In addition, because the secondary storage system is mirroring with the primary storage system, therefore each file in the destination storage system is corresponding to each file of the primary storage system.

Yanai does not particularly disclose each said file corresponding to a separate one of the plurality of source storage servers.

Zondervan et al. discloses a plurality of source storage systems. (See Fig. 1, item 12a-12b).

It would have been obvious to one having an ordinary skill in the art at the time of the Applicant's invention to modify the source storage system of Yanai to include plurality of source storage systems as disclosed by Zondervan et al. The motivation of doing so is to add the data storage availability as well as data storage area in order to meet the storage demand by the clients.

Yanai does not particularly disclose plurality of log files. However, it would have been obvious to one having an ordinary skill in the art at the time of the Applicant's invention to readily recognize that adding additional source storage servers will require more logging. Therefore, it would have been obvious to one having an ordinary skill in the art at the time of the Applicant's invention to have separate log file for each source storage server. In addition, it is also a user design choice to storage all information into one log file or plurality of log files.

As per claim 23, Yanai et al. discloses a method, wherein each partition of the partitioned non-volatile random access memory in each of the source storage servers corresponds to a distinct one of the plurality of files in the non-volatile mass storage subsystem. See Fig. 12, items 293 and 294, wherein the log file is corresponding to the data file.

3. Claims 1, 3, 4, 6, 10, 12, 14-15, and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanai et al. (US Patent 6,502,205) in view of Courts et al. (US Patent 5,636,360)

As per claims 1, 10, and 24, Yanai et al. discloses a method for mirroring data comprising:

receiving at a first storage server (Fig. 1, item 14) a data access request from a client (Fig. 1, item 12) coupled to the first storage server 14 (See col. 2, line 60 - col. 3, line 9);

writing the data access request to a first portion of a non-volatile storage device (Fig. 1, item 28) in the first storage server (col. 7, line 66 – col. 8, line 1);

transmitting the data access request from the first storage server 14 to a second storage server (Fig. 1, item 46), wherein the second storage server writes the data to the data access request to a non-volatile random access memory (col. 18, lines 5-7) in the second storage server and into a file stored in a mass storage device (Fig. 1, item 48) on the second storage server (See col. 10, lines 51-55);

applying the data access request in the first portion of the non-volatile storage device to a volume managed by the first storage server and causing the second storage server to apply the data access request in the file stored in the mass storage device to an image volume of the volume, wherein the second storage server manages the image volume and the mass storage device. See Fig. 12, col. 32, lines 49-67, wherein the secondary volume is an image of primary volume and the primary volume is managed by the primary storage system and the secondary volume is managed by the secondary storage system. In addition, non-volatile storage device and mass storage device are equivalent to the disk drives in the primary and secondary storage system to make up the volumes.

Yanai et al. does not particular teach when a log file is full then the data is transferred to the log file of the secondary storage device.

Court et al. teaches a method of copying the contents of a log buffer to a log partition when the log buffer is full (col. 2, lines 35-37).

Therefore, it would have been obvious to one having an ordinary skill in the art at the time of the Applicant invention modify the cache of Yanai et al. to implement the method teaches by Court et al. to arrive at the current invention. The motivation of doing so is to avoid the data currently storing in the cache to be overwritten by the incoming data when the data currently storing in the cache are critical or valuable data as being taught by Yanai et al. at col. 1, lines 47-56.

Yanai et al. and Court et al. do not particularly disclose the second storage server uses the file to recover the data in the image volume if a disaster occurs.

Yanai et al., however, discloses a method of restoring the most recent image copy of data.

Therefore, it would have been obvious to one having an ordinary skill in the art at the time of the Applicant's invention to modify the second storage server to include an image volume so that the data can be recover in case the file in the storage volume is corrupted or lost.

As per claim 3, Yanai et al. sending a synchronization request at the second storage server from the first storage server when the first portion of the non-volatile storage device in the first server is full (see col. 10, lines 19-23); wherein as discussed in claim 1 above, the data is transferred from cache to R1 and R1 synchronize the updated data with R2.

As per claim 4, Yanai et al. discloses a method comprising:

sending an acknowledgement from the second storage server to the first storage server in response to receiving the data access request (col. 10, lines 19-24) to cause the first storage server to send a response to the client (col. 32, lines 26-27) after the data access request has been stored on the first storage server and stored in the mass storage device on the second storage server. See col. 32, lines 49-57 and col. 2, lines 60-67.

As per claims 6 and 25, file is associated with the first portion of the non-volatile storage device in the first storage server is inherent feature of Yanai et al. since the data

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that stored in the second storage server is previously transferred from the cache, therefore they are associated or related with each other.

As per claim 7, Yanai et al. discloses a method wherein the data access request is transmitted from the first storage server to the second storage server over a network. (Fig. 12, items 240-241 and col. 12, lines 40-42)

As per claims 8 and 27, Yanai et al. discloses a method comprising:
assigning a sequence number to the data access request, wherein the sequence number designates a position of the data access request in a group of data access requests to ensure that the data access request is properly ordered within the data container. See col. 18 lines 45-54.

As per claim 12, Yanai et al. discloses an apparatus wherein the network comprises a Transmission Control Protocol/Internet Protocol (TCP/IP) network. See col. 13, lines 7-13, wherein the TCP/IP is an inherent feature of the ESCON system.

As per claim 14, Yanai et al. discloses an apparatus wherein the memory comprises a nonvolatile random access memory (NVRAM). See col. 18, lines 5-9, *wherein random access memory is backed-up by a battery power which makes the RAM becomes a nonvolatile random access memory.*

As per claim 15, Yanai et al. discloses an apparatus wherein the destination storage server modifies an image of a volume maintained by the source storage server

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on a second nonvolatile mass storage device (secondary volumes) coupled to the destination storage server according to the access request (col. 10, lines 50-58) when the source storage server makes a synchronization request (col. 10, lines 19-23).

As per claim 26, Yanai et al. discloses the mass storage device includes a disk. See col. 7, lines 60-63.

Allowable Subject Matter

Claims 17, 19, and 20 are allowed.

Claims 22 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

4. Applicant's arguments filed on April 28, 2008 have been fully considered but they are not persuasive.

Applicant's argument on page 10 of the remarks with respect to claim 21, which Applicant also relied upon for claim 1, indicated that Yanai fails to teach a "non-volatile random access memory" in the destination storage server and into a file stored in a mass storage subsystem managed by the destination storage server. Applicant further argued that neither log file 293 nor 294 are implemented in non-volatile random memory.

Examiner respectfully disagrees, Applicant has argued away from the reference cited by the Examiner in the Office Action. The non-volatile random access memory is being disclosed in col. 18, lines 5-7 of Yanai rather than the log file and data file as argued by the Applicant.

Applicant further argued on page 12, with respect to claim 1, that the method of transferring/copying the content from a first location to a second location when the first location is full is different and not obvious to the method of "when the first portion of the non-volatile storage device in the first storage server becomes full, applying the data access request in the first portion of the non-volatile storage device to a volume managed by the first storage server".

Examiner respectfully disagrees. Although the method of copying is performed on different storage types in Courts' disclosure however it is obvious to one having an ordinary skill in the art at the time of the Applicant's invention to modify such method and apply to the storage system of Yanai so that when the first storage is full, the data can be transferred to another location so that the first storage can readily accepting new data.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh D. Vo whose telephone number is (571) 272-0708. The examiner can normally be reached on M-F 9AM-5:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reginald G. Bragdon can be reached on (571) 272-4204. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Thanh D Vo/
Examiner, Art Unit 2189

/Reginald G. Bragdon/
Supervisory Patent Examiner, Art Unit 2189